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Maritimes Region

Canadian Science Advisory Secretariat
Science Response 2015/012

SCALLOP FISHERY AREA/TIME CLOSURE TO PROTECT COD SPAWNING AGGREGATIONS IN 5Z (GEORGES BANK)

Context

The requirement to account for all fishing mortality of Georges Bank Atlantic Cod (*Gadus morhua*) in Canada has led to efforts by the offshore Scallop fishery to reduce Cod bycatch. Along with active avoidance protocols adopted by the offshore Scallop fleet, Fisheries and Oceans Canada (DFO) has implemented area/time closures from early February to the end of March since 2005 to reduce bycatch and minimize disturbance to spawning aggregations of Cod by the offshore Scallop fishery on Georges Bank. To assist resource managers in determining appropriate area closures for the offshore Scallop fishery on Georges Bank during the Cod spawning seasons, fisheries management asked the following question: "What does a review of eastern Georges Bank (Northwest Atlantic Fisheries Organization unit areas 5Zj and 5Zm) Cod distribution, particularly at spawning time, reveal about the spatial trends of the species and its overlap with the offshore Scallop fishery? Highlight areas of high 5Zjm Cod distribution using the cells previously defined and used."

This document provides information on the spatial distribution of Cod abundance on eastern Georges Bank during the spawning period based upon the DFO February/March Georges Bank research vessel (RV) survey and its overlap with Scallop catches on the Canadian portion of Georges Bank. In the 2013 analysis, a comparison of the most recent 10-year spatial distribution of Cod to that for the whole time series (starting in 1996) showed that a change in distribution had occurred (DFO, 2013). It was determined that using the most recent 10-year moving window to examine the spatial trends of Cod distribution during the spawning period should achieve the objective of reducing Cod bycatch and disturbance of spawning aggregations. Therefore, this analysis uses data on Cod distribution from 2005 to 2014.

This Science Response Report results from the Science Response Process of January 20, 2015 on Review of Scallop Fishery Closure to Protect Cod Spawning Aggregations on Georges Bank in 2015.

Analysis and Response

The 2014 first quarter Canadian offshore Scallop catches on Georges Bank correspond to approximately 13% (735 metric tonnes (mt) of meats) of the Total Allowable Catch (TAC) for the year, which is below the long term average percentage for the first quarter (17% since 1990). At the start of the 2014 fishery (January), there were three industry-managed juvenile Scallop closure areas in place (outlined in red, green and blue in Figures 1 and 2). The green box ("seed box") was opened to fishing on June 1, 2014 and the red box ("a/b line box") was opened to fishing on August 27, 2014. The blue box ("box C1 012014") is still in place at the time of submission of this document.

The analysis used to provide this information uses data on Cod abundance on eastern Georges Bank obtained from the annual DFO Research Vessel (RV) survey from 2005 to 2014, as well as Scallop catches from the Canadian offshore Scallop fishery logbooks from 2014. Details on the methods for this analysis can be found in Maritimes Region Science Expert Opinion 2006

(DFO, 2006). Information from the DFO RV survey for 5Zjm conducted during late February/early March was used to identify areas of high aggregations of adult (age 3+) Cod. The distribution of age 3+ Cod was plotted on a grid of 5-minute longitude by 3.33-minute latitude cells (approximately 12.5 nautical miles^2 or 43 kilometres^2 per cell). Cod abundance data were "standardized" by dividing the number of Cod per tow by the mean number per tow for the strata representing 5Zjm for each year of the survey. These standardized estimates were averaged in each cell over the 2005 to 2014 time period. This has the effect of reducing the influence of very large tows and reducing between-year variability. In the previous year's analysis, a comparison of the most recent 10-year spatial distribution to that for the whole time series (starting in 1996) showed that a change in distribution had occurred, indicating that the full time series did not reflect recent Cod distribution patterns adequately and the most recent 10-year period better reflected current conditions (DFO, 2013).

The average high Cod aggregation areas for the last decade (i.e., cells with greater than 3.5 standardized age 3+ Cod per tow), numbered 1 to 13 in order of decreasing abundance (Figure 1), were compared to 2014 first quarter Scallop catches in those areas (Table 1). Thirteen of the 15 cells ranked in the 2014 analysis remained as ranked cells in this analysis. Five of the cells from the 2014 analysis (Cells 1, 2, 8, 9 and 10; DFO, 2014a) have the same ranking in this analysis and 2 of the cells (Cells 6 and 11) from 2014 are no longer present.

Six ranked cells (1, 2, 4, 5, 7 and 8) were part of the 2014 Scallop fishery Cod closure (DFO, 2014b). The strongest aggregation of Cod occurred in an area near the center of the bank; however, there were also noteworthy high density cells of 3+ Cod on the southern part of the bank (cells ranked 1 and 2).

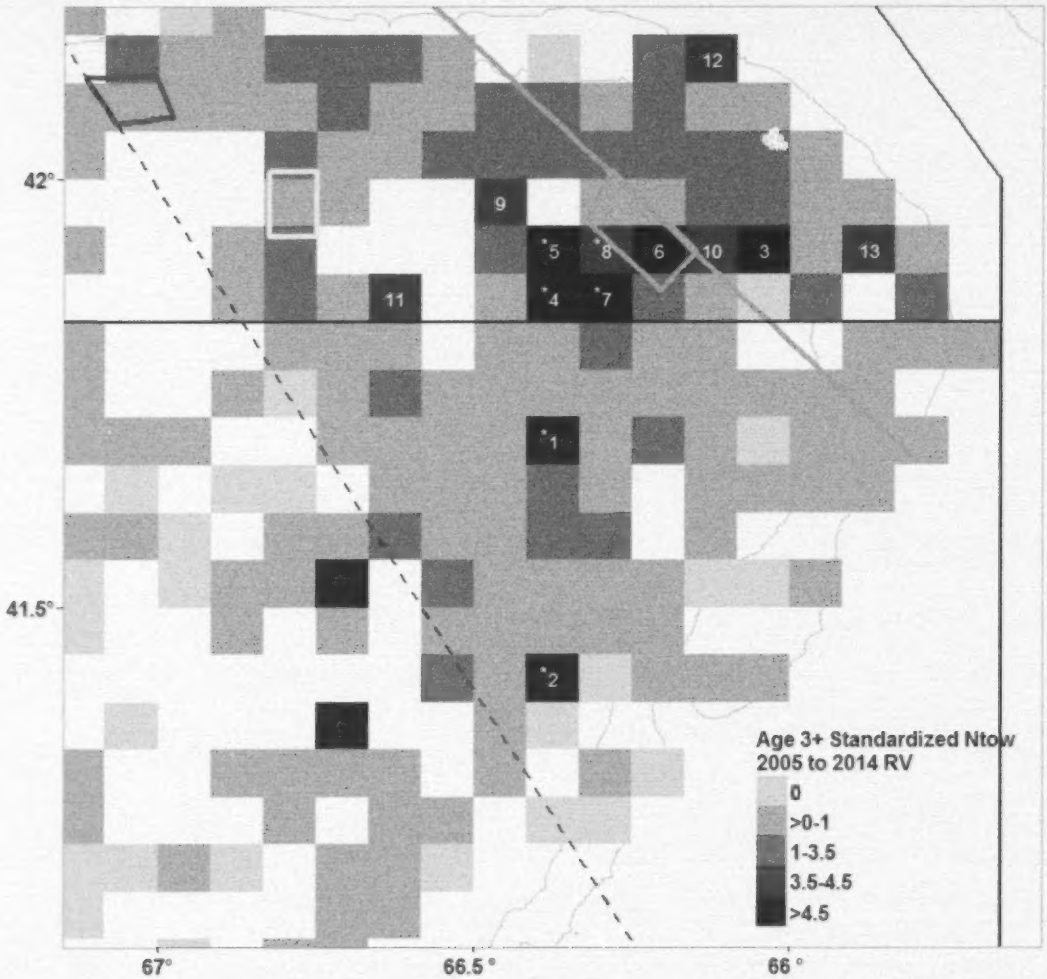


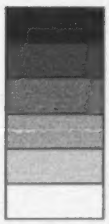
Figure 1. Distribution of aggregated age 3+ Cod on eastern Georges Bank in late February/early March from DFO research survey data (2005 to 2014). The number per tow (N/tow) has been standardized by dividing the N/tow by the mean N/tow for the whole area, i.e. 5Zjm, for each year of the survey and then averaged in each cell from 2005 to 2014. Cells representing values greater than 3.5 standardized N/tow were ranked (highest to lowest, Canadian side only). Cells that were part of the 2014 Scallop fishery Cod closure are indicated by an asterisk (*). The 3 industry-initiated Scallop fishery closure areas in place for the first quarter of the 2014 Scallop fishery are indicated by the red, green, and blue boxes. The horizontal black line demarcates Northwest Atlantic Fisheries Organization divisions 5Zj and 5Zm. The diagonal red line demarcates the Georges Bank Scallop management areas 'a' and 'b'. The diagonal dashed line indicates the Canada/USA International Court of Justice line.

Table 1. Association between 2014 Eastern Georges Bank first quarter Scallop catch (mt of meats) by the Canadian offshore Scallop fleet and cells of high Cod density (cells with 3.5 or more standardized age 3+ Cod on average in Feb/Mar RV survey data). The Cod cells, numbered 1 to 13 are in descending order of Cod abundance. Greyscale rankings indicate the abundance of Scallop catch that corresponds to each cell of high Cod density.

Year/ Cod Cell Num.	1*	2*	3	4*	5*	6	7*	8*	9	10	11	12	13
2014	0	0	0	0	0	0	0	0	96	0	0	0	0
2013	0	0	0	0	0		0	0	4	1	0	0	0
2012	0	0	0	13	12	11	26	4	1	0	0	0	0
2011	0	0	0	8	6	0	26	8	7	0	0	0	0
2010	0	0	0	0	0	1	4	0	12	0	5	0	0
2009	0	0	0	0	0	9	1	2	32	0	1	0	1
2008	0	0	0	0	0	110	58	84	35	0	0	0	0
2007	0	0	0	0	0	2	1	0	373	0	0	0	0
2006	0	0	0	0	0	0	0	0	0	0	0	0	0
2005	1	0	5	0	1	0	2	2	0	9	1	0	0

** indicates cells that were part of the 2014 closure*

Legend: Scallop Catch
Colour: Scallop Catch (mt of meats)



50 = Catch ≥ 50
25 = catch < 50
10 = catch < 25
5 = catch < 10
0 < catch < 5
Catch = 0

Only one of the top 13 ranked Cod cells had Scallop landings in Q1 of 2014 (cells 9). This cell had a total of 96.3 mt of catch for this period (~13% of the total Canadian Q1 Scallop catch of 735 mt on Georges Bank).

The cells selected for closure in 2014 (see asterisks in Figures 1 and Table 1) had no Q1 Scallop landings prior to the closure, which began on February 6, 2014. A closure similar to 2014 based on the top ranking cells would have a relatively low impact on the offshore Scallop fishery if the 2015 Q1 Scallop fishing distribution is similar to that of the first quarter in 2014 (Figure 2). This low impact may be the result of the displacement of Scallop fishing to other areas in the first quarter, perhaps due to the Cod area/time closures and voluntary Scallop fishery closure areas.

If Scallop fishing in Q1 is confined primarily to 5Zj, as it was in 2014, closure of cells ranked 1 and 2 would have no effect on Scallop catches.

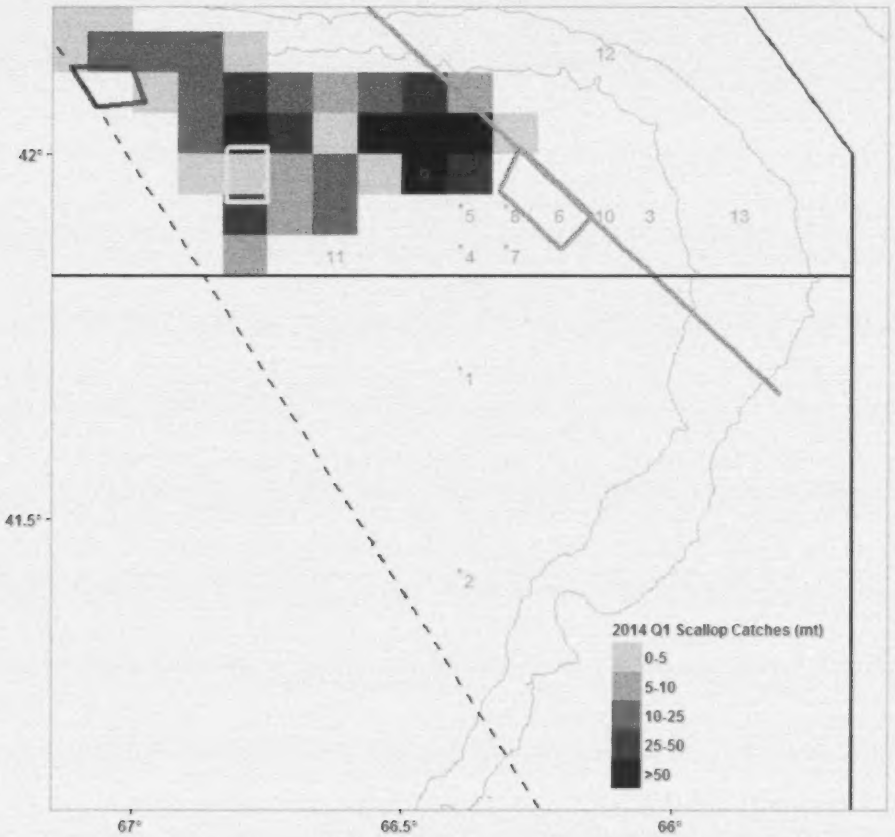


Figure 2. Distribution of Eastern Georges Bank offshore Scallop catches (mt of meat) by the Canadian Scallop fishery during the first quarter of 2014. The 3 industry-initiated Scallop fishery closure areas in place for the first quarter of the 2014 Scallop fishery are indicated by the red, green, and blue boxes. The horizontal black line demarcates Northwest Atlantic Fisheries Organization divisions 5Zj and 5Zm. The diagonal red line demarcates the Georges Bank Scallop management areas 'a' and 'b'. The diagonal dashed line indicates the Canada/USA International Court of Justice line. Cells that were part of the 2014 Scallop fishery Cod closure are indicated by an asterisk (*). Numbers 1 to 13 represent the ranked Cod cells from Figure 1.

Conclusions

To reflect the current Cod distribution, a Cod area/time closure for 2015 should be based on the average Cod distribution from 2005 to 2014. A closure based on the top ranking cells would have a relatively low impact on the offshore Scallop fishery provided the 2015 first quarter Scallop fishing distribution is similar to that of the first quarter in 2014.

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Sources of Information

DFO. 2006. Science Expert Opinion on Scallop Fishery Area/Time Close - 2006. Mar. Reg. Expert Opin. 2006/05.

DFO. 2013. Scallop Fishery Area/Time Closure to Protect Cod Spawning Aggregations in 5Z (Georges Bank). DFO Can. Sci. Advis. Sec. Sci. Resp. 2013/008.

DFO. 2014a. Scallop Fishery Area/Time Closure to Protect Cod Spawning Aggregations in 5Z (Georges Bank). DFO Can. Sci. Advis. Sec. Sci. Resp. 2014/023.

DFO,.2014b. Maritimes Region Close Time Variation Order, 2014-014.

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